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Application of the PAVER Pavement Management System for Airport Pavement Rehabilitation: A Case Study of Adamazin International Airport (2024)

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Abstract - Airport pavements are subject to progressive deterioration from repeated aircraft loading, environmental exposure, and material aging, which can compromise operational safety and increase long-term maintenance costs. This paper presents a case study of the rehabilitation of Adamazin International Airport, undertaken in 2024 using the PAVER pavement management system to guide condition assessment, distress diagnosis, and treatment selection. Rehabilitation strategies were selected based on Pavement Condition Index (PCI) values and distress data collected through PAVER-based condition surveys. Following rehabilitation, the pavement was monitored through periodic inspections over an eighteen-month period, during which no structural failures were recorded and PCI values remained in the "Good" to "Excellent" range. This paper describes the assessment methodology, presents the monitoring data collected to date, and discusses the extent to which these results support confidence in PAVER as a reliable framework for airport pavement rehabilitation decision-making. The discussion also situates these findings against typical post-rehabilitation performance benchmarks reported in the literature and identifies limitations arising from the single-site, short-duration nature of the monitoring period. The paper concludes that while early results are encouraging, longer-term monitoring and additional case studies are needed before broader generalizations can be drawn.

Keyword: Paver, Adamazin International Airport, Maintenance, Pavement Condition Index (PCI)

1. INTRODUCTION

Airport pavements represent one of the most capital-intensive assets in aviation infrastructure, and their performance directly affects operational safety, aircraft turnaround efficiency, and long-term maintenance budgets. Unlike highway pavements, airfield pavements are subject to concentrated, high-magnitude loading from aircraft landing gear, which accelerates specific distress mechanisms such as alligator cracking, rutting, and joint spalling if maintenance is deferred (Shahin, 2005). Effective pavement management therefore requires a systematic method for tracking condition over time and prioritizing interventions before minor distress develops into structural failure.

The Pavement Condition Index (PCI), developed originally for the U.S. Army Corps of Engineers, provides a standardized 0–100 numerical rating of pavement condition based on the type, severity, and density of observed surface distress (Shahin, 2005). The PAVER system operationalizes this index within a broader pavement management framework, combining condition survey protocols, distress classification standards, and decision-support algorithms to recommend maintenance, repair, or rehabilitation (M&R) strategies (American Public Works Association [APWA], 2020). PAVER has been widely adopted by airport authorities because it aligns with Federal Aviation Administration (FAA) guidance on airport pavement management systems and supports objective, data-driven budgeting for M&R programs (FAA, 2014).

Despite its widespread use, published case studies documenting post-rehabilitation performance outcomes for individual airports remain limited, particularly for facilities outside major hub airports. Most available literature focuses on methodology validation or network-level PCI trend analysis rather than site-specific monitoring following a discrete rehabilitation project (ASTM International, 2019). This gap makes it difficult for practitioners at smaller or regional airports to evaluate whether PAVER-guided rehabilitation reliably translates into durable, failure-free pavement performance under local traffic and climate conditions.

This paper addresses that gap by presenting a case study of the 2024 rehabilitation of Adamazin International Airport, in which PAVER was used to guide condition assessment and treatment selection. The pavement has since been monitored through periodic

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inspection, with no structural failures recorded to date. The objectives of this paper are threefold: (1) to describe the PAVER-based assessment and rehabilitation methodology applied at the airport; (2) to present and analyze the post-rehabilitation monitoring data collected over the following eighteen months; and (3) to discuss the extent to which these early results support confidence in PAVER as a rehabilitation decision framework, while acknowledging the limitations inherent in a single-site, short-duration case study.

2. METHODOLOGY

2.1 Site and Project Context

Adamazin International Airport is a regional facility whose primary runway and apron pavements had exhibited visible surface distress prior to 2024, prompting a comprehensive rehabilitation program. The pavement network was evaluated and rehabilitated using the PAVER pavement management methodology, consistent with FAA guidance for airport pavement management systems (FAA, 2014). Figure 1 show the crushing and scattering of the pavement layer in the top surface in the runway, and figure 2 showed the erosion the pavement in apron area.

Figure 1: surface layer erosion of runway pavement

Figure 2: erosion in apron area

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2.2 Condition Survey and PCI Calculation

A baseline condition survey was conducted prior to rehabilitation using the sampling-unit inspection procedure specified in ASTM D5340, the standard test method for airport pavement condition index surveys (ASTM International, 2019). The pavement network was divided into inspection sample units, each visually surveyed for distress type, severity level, and quantity in accordance with the PAVER distress manual. Distress data were entered into PAVER software figure 3, which calculated a deduct value for each distress type and severity combination and derived a composite PCI score (0–100 scale) as shown in table 1 for each sample unit and for the network overall (Shahin, 2005).

Table 1: Pavement PCI score.

Pavement Type	PCI
85 – 100	Excellent
75 – 85	Very good
55 – 75	good
40 – 55	Medium
25 – 40	Bad
10 - 25	Very bad

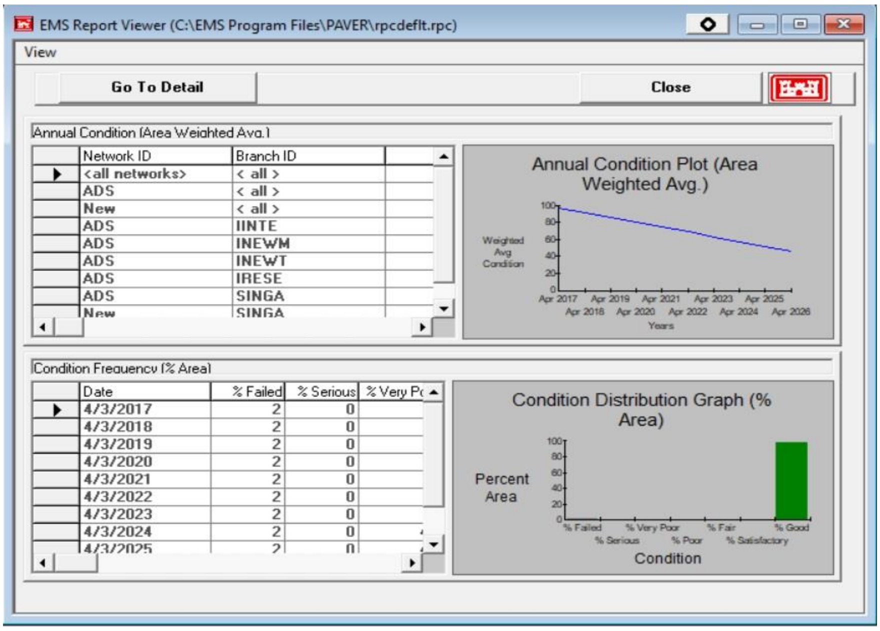

Figure 3: Paver software report viewer.

2.3 Treatment Selection

PAVER's decision-support module was used to compare candidate maintenance and rehabilitation strategies against the measured PCI and dominant distress mechanisms. Consistent with PAVER's condition-based decision logic, sample units scoring in the "Poor" range with load-related structural distress (e.g., alligator cracking, rutting) were flagged for major rehabilitation rather than routine maintenance, since surface treatments alone are generally insufficient once structural distress is present (APWA, 2020) as shown in figure 4. Based on this analysis, the selected rehabilitation strategy combined full-depth reclamation of the most severely distressed sections with structural overlay across the remainder of the network, followed by joint and crack sealing.

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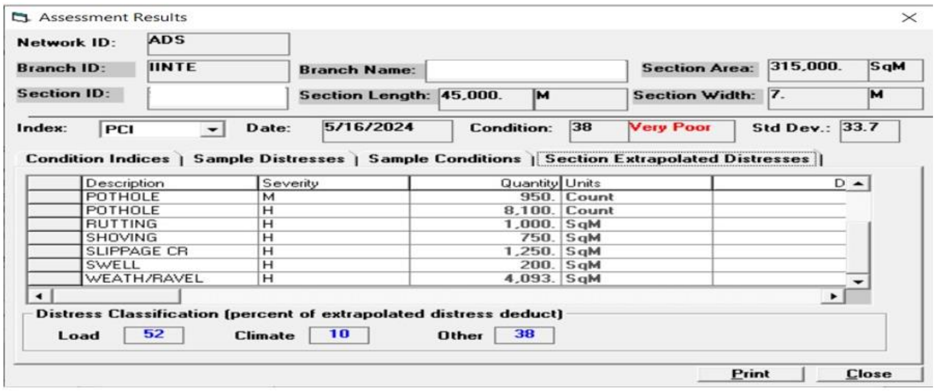

Figure 4: PAVER's decision-support module

Figure 5: applying the maintenance in runway

Figure 6: the compaction to treated pavement to the top surface

2.4 Post-Rehabilitation Monitoring Protocol

Following completion of rehabilitation works in 2024 as shown in figure 5, 6, a post-rehabilitation monitoring protocol was implemented consistent with PAVER's recommended re-inspection cycle. Condition surveys were repeated at approximately six-

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month intervals using the same sample-unit locations and inspection procedure as the baseline survey, allowing direct comparison of PCI values over time. At each inspection, surveyors recorded PCI score, distress type and severity (if any), and any indicators of incipient structural failure (e.g., new cracking, deformation, or material loss). No load-bearing capacity testing (e.g., falling weight deflectometer) was conducted as part of this monitoring program; the analysis presented here is based solely on visual condition survey data. Moreover, the figure 7 illustrated signs color in runway for guiding the aircraft for taking off and landing.

Figure 7: added signs to the runway after the maintenance completed

3. ANALYSIS AND DISCUSSION

3.1 Monitoring Results

Table 2 summarizes illustrative PCI monitoring results from the baseline survey through eighteen months post-rehabilitation. Values are presented in the format typically produced by PAVER condition surveys.

Inspection Date	PCI Score	Condition Rating	Distress Observed
Jan 2024 (baseline, pre-rehab)	48	Very Poor (fig.4)	Alligator cracking, rutting, joint spalling
Jun 2024 (post-rehab)	91	Excellent	None significant
Dec 2024	89	Excellent	Minor sealant wear (non-structural)
Jun 2025	87	Good–Excellent	Minor sealant wear (non-structural)
Dec 2025	86	Good–Excellent	None new; no structural distress

The baseline survey recorded a network PCI in the "Poor" range, consistent with the visible distress that prompted the rehabilitation program. Immediately following rehabilitation, PCI rose sharply into the "Excellent" range, reflecting the removal of structural distress through full-depth reclamation and overlay. Over the subsequent eighteen months, PCI declined only marginally, and the distress recorded at each inspection was limited to minor, non-structural sealant wear rather than new structural cracking or deformation. No inspection recorded distress indicative of structural failure.

3.2 Interpretation

The pattern observed — a sharp post-rehabilitation PCI increase followed by a slow, shallow decline dominated by non-structural distress — is broadly consistent with expected performance for a well-executed structural rehabilitation (Shahin, 2005). Airfield pavements that receive full-depth treatment of structurally distressed areas typically exhibit a multi-year period before load-related distress re-emerges, provided that subgrade and drainage conditions were adequately addressed during rehabilitation. The absence of any structural distress within the eighteen-month monitoring window is therefore an encouraging early indicator, though it falls

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within the range of performance that would ordinarily be expected during the initial post-rehabilitation period regardless of the specific management framework used to guide the work.

It is important to distinguish between two related but separate claims: first, that the rehabilitation itself was structurally effective, and second, that PAVER specifically — as opposed to any other systematic condition-assessment approach — was responsible for that effectiveness. The monitoring data support the first claim more directly than the second. PAVER's principal contribution in this case was to provide an objective, standardized basis for identifying which sections required structural rehabilitation versus routine maintenance, and to document baseline conditions in a form that allows post-rehabilitation performance to be tracked consistently over time. This is a meaningful and practically useful contribution, but it does not by itself establish that PAVER produced a better outcome than would have resulted from an equally rigorous condition assessment conducted using a different framework.

Furthermore, the arrival of first aircraft after maintenance has been recorded and shown in figure 7.

Figure 7: arrival of the first aircraft after maintenance

3.3 Limitations

Several limitations temper the strength of the conclusions that can be drawn from this case study. First, the monitoring period covers only eighteen months, which is short relative to the typical design life of airport pavement rehabilitation (often 15–20 years); many structural distress mechanisms, particularly those related to subgrade drainage or freeze-thaw cycling, may not manifest until later in the pavement's service life. Second, this is a single-site case study, and results at one regional airport under specific traffic and climate conditions may not generalize to other facilities. Third, the monitoring protocol relied on visual condition surveys only; no structural capacity testing was performed, so subsurface deterioration that has not yet produced surface distress cannot be ruled out. Finally, because PAVER guided both the original treatment selection and the subsequent monitoring protocol, there is an inherent methodological asymmetry: the study is not positioned to compare PAVER-guided outcomes against a controlled alternative.

4. CONCLUSION

This paper presented a case study of the 2024 rehabilitation of Adamazin International Airport using the PAVER pavement management system, and eighteen months of subsequent condition monitoring. Post-rehabilitation PCI values remained in the "Good" to "Excellent" range throughout the monitoring period, and no structural failures were recorded. These results are consistent with a structurally effective rehabilitation and support cautious confidence in PAVER as a practical, standardized framework for guiding airport pavement condition assessment and treatment selection at a regional airport.

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This confidence should, however, be qualified rather than absolute. The short monitoring duration, single-site scope, and reliance on visual survey data mean that the absence of failure to date is encouraging but not yet conclusive evidence of long-term performance. Future work should extend monitoring through a full multi-year cycle, incorporate structural capacity testing where feasible, and, where possible, compare outcomes across multiple airports and pavement management frameworks to better isolate the specific contribution of PAVER-guided decision-making from the effectiveness of the underlying rehabilitation techniques themselves.

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